

A N
E S S A Y
O N
DRAINING AND IMPROVING
P E A T B O G S.

[Price 3 s.]



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AN
ESSAY
ON

DRAINING AND IMPROVING
PEAT BOGS;

In which their NATURE and PROPERTIES are
fully considered.

BY MR. NICHOLAS TURNER,
OF BIGNOR, SUSSEX.

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T O
The RIGHT HONOURABLE
T H E
EARL OF EGREMONT.

SUFFER me, my Lord, to express the warmest Acknowledgements for your obliging Permission to put this short Essay, the Result of some Observation and Attention, under your Lordship's Protection.

Perfectly conscious that it has no claim from its merit to your Lordship's Patronage, I yet venture to hope, that as it treats of a Matter which begins to be seen in an important Light, the
A utility

DEDICATION.

utility of the Improvement proposed, (however slightly this humble Essay may assist it) will be an Apology for my Presumption in laying it before you: And to whom, my Lord, should attempts of this kind be addressed, if not to those who, like your Lordship, have the knowledge to discern, and the Spirit to execute, any plan that may appear likely to benefit their Country?

When power, my Lord, is united with Judgment and Philanthropy, it has the most unfailing and best effects on the face of a Country, and on the happiness of its Inhabitants.

I appeal

DEDICATION.

I appeal to those who are acquainted with your Lordship's great possessions in England for the truth of this remark; and I doubt not but your extensive Property in Ireland has its share of these advantages.

I dare not enlarge on such a Topic, which would carry me into too wide a Field; I will therefore only beg to be permitted the honor of subscribing myself,

My Lord,

Your Lordship's

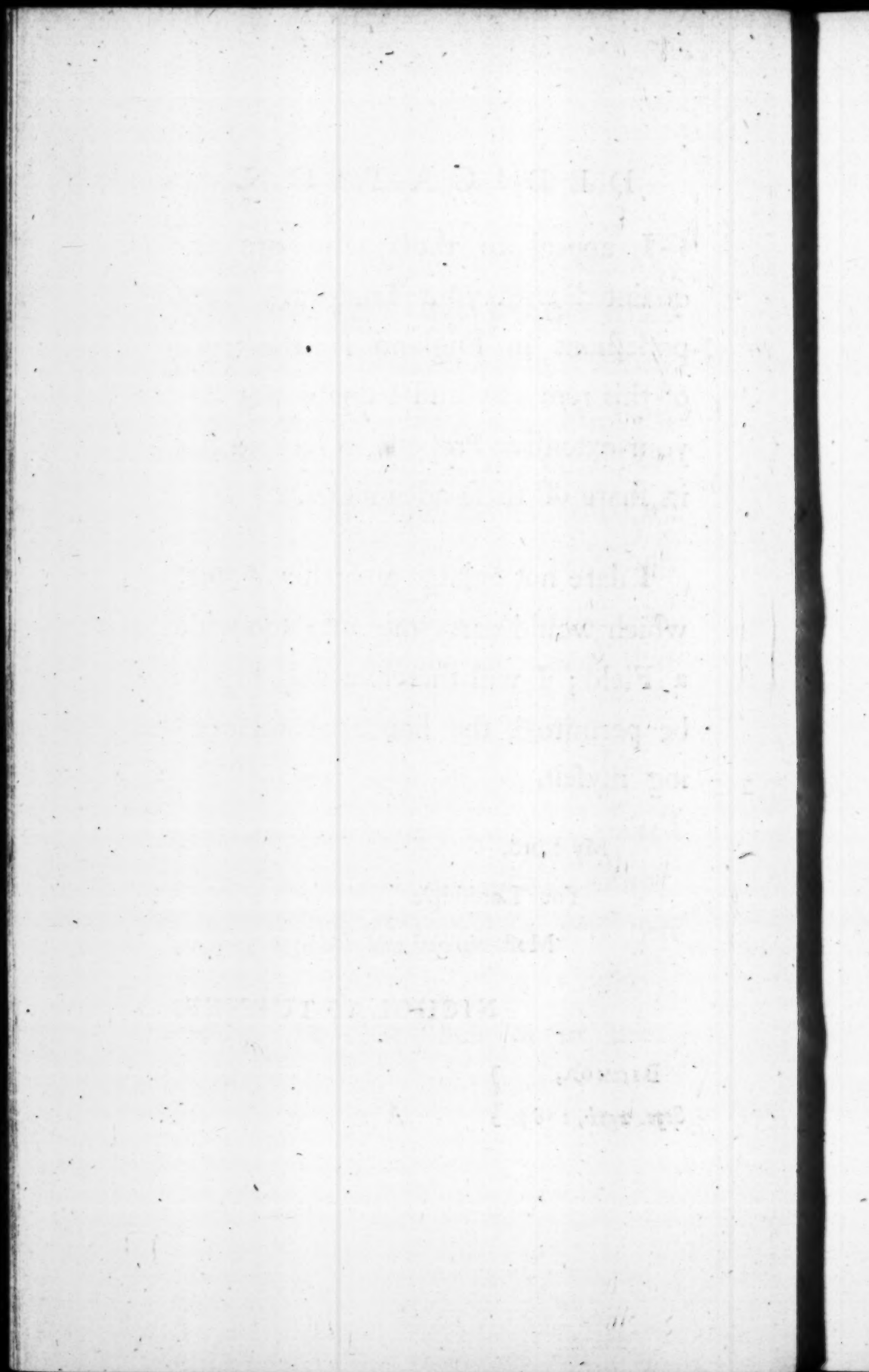
Most obliged and obedient Servant,

NICHOLAS TURNER.

BIGNOR,

Sept. 25th, 1784. }

A 2



P R E F A C E.

THE most discerning part of mankind have in all ages considered agriculture of the greatest importance, and the wisest men of every civilized nation have studied the improvement of this most necessary art, on which the strength, wealth, and prosperity of their country depended.

It received from the Romans every possible encouragement, especially by the example of their Dictators and Senators, who did not think it beneath them to be actually employed in the labours of the field: But when baneful luxury enervated them, husbandry languished, and remained in a declining state till about the middle of the
last

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last century; for the Roman Authors are the best extant on the subject till about that period, when the rapid strides of philosophy and chemistry gave fresh life to agriculture.

The writers of the present age have particularly bestowed their labours to rescue it from that obscurity in which it had been so long involved. The names of Home, Hunter, and Fordyce stand foremost in the list of modern authors who have opened to our view the true principles of the art; nor has the indefatigable Mr. Young been less beneficial in minuting the numerous experiments of the ablest cultivators in different parts of the kingdom; and the credit their names have acquired, by being recorded, shews in what a patriotic view an improver is considered. Animated with this, and conceiving that great numbers of men
discharged

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discharged from the public service cannot even now be got into a regular chain of employment, and that, from the dearness of the necessaries of life, it is thought indispensably requisite to cultivate the vast tracts of waste land with which England and Ireland abound; I thought it would not be improper to lay before the public the ideas of the best writers who have treated the subject, collected into a small compass, as many persons may be interested in the improvement who would dislike the labour of going thro' many of those authors. I have besides had a few opportunities of practice and observation, which possibly may have given me some little insight into the nature of the particular species of waste called peat bogs; and this practice and observation has, in some instances, appeared to confirm, and in others has obliged me to dissent from,

P R E F A C E.

from, the theory of several of the authors I have consulted.

On the whole, if any thing herein mentioned appears to be reasonable enough to engage any more able pen in the discussion of a point, the importance of which is universally allowed, or if I am fortunate enough to throw out any hints that may be found to facilitate this capital improvement, my purpose will be fully answered.

An Essay

A N E S S A Y
O N
D R A I N I N G, &c.

VARIOUS are the conjectures on the origin of bogs: Many suppose them co-eval with the deluge. The particles of sticks, rushes, straw, and a variety of other matter they contain, particularly the several sorts of timber trees, which mostly lie in the same direction, and many of them close to the roots they belonged to, seem to corroborate the opinion, that

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these

these foreign bodies, swimming on the surface of the water, were stopped by the tops of the trees, and that their great weight, on the further subsiding of the water, crushed the trees down under it in the manner they are found in the bogs. However plausible this opinion may be, it is liable to many objections; for if bogs are composed of all the light bodies that swim on the surface of the water, (as wreck at the time of the deluge) bogs should have been uniformly on the summits of the highest mountains, as it would of course stop and gather there, and not in bottoms; for the sea and rivers ever leave their wreck at high water mark, and no where else; and all land floods the same. Timber being found at the bottom of the bogs as it fell, is not more convincing; for Solway Moss, in Cumberland, in the year 1771 overflowed its former bounds, covered

covered many hundred acres, and laid hedges, trees, and whatever it met with, flat.

Another instance of a moving bog was in June 1697, near Charleville, in the county of Limerick, in Ireland, on the estate of Brook Bridges, Esq. and communicated to the Royal Society by William Molyneux, Esq. who gives an account of its covering eight acres of land, sixteen feet deep, overturning the intermediate hedges, which consisted of large ash and withy: and Mr. William King, fellow of the Dublin Society, in a paper he presented to that society on the bogs and loughs of Ireland, says, “ There are many
 “ bogs of late standing in Ireland.
 “ When O’Donald and Tyrone came
 “ to the relief of Kinsale, they wasted
 “ the country; especially as they
 “ came through Connaught, which,

“ by the means of the Earl of Clan-
 “ rickard, was generally loyal; and
 “ there is a large tract of land now a
 “ bog that was then ploughed land,
 “ and there remains the mansion
 “ house of my Lord ——— in the
 “ midst of it. Now if want of in-
 “ dustry has, in our memory, made
 “ one bog, no wonder if a country
 “ famous for laziness as Ireland is
 “ abounds with them.”

Bogs have gained ground in Eng-
 land, though not from the same cause.
 In the Philosophical Transactions, No.
 275, an account is given of infinite
 millions of the roots and bodies of trees
 that are found in Hatfield Chace, near
 Doncaster, in Yorkshire. The roots
 stand in their natural position, and are
 as thick as in a forest: the bodies are
 broke off, and lie just as they fell.
 The fir or pitch tree are the most com-
 mon,

mon, being from fixty to one hundred feet long, and so durable as to be sold for masts of vessels. There are also oaks of the same length, although wanting their tops: they are as black as ebony, and so sound and lasting that they have fetched from ten to fifteen pounds each. Many of these trees appear to have been burnt off, particularly the fir trees, some of which have the marks of human work upon them, as being squared; some cleft with the wedges remaining in the cracks which are of wood and stone, but none of iron.

This once noble forest, now a bog, was a strong hold for the Britons, from whence they annoyed the Romans, who, for the safety of Doncaster, then one of their chief garrisons in that part of England, ordered it to be destroyed; which affords us a melancholy proof
of

of the effects of despotism, altho' nothing to compare in cruelty to the subsequent transaction of William the Conqueror in making the New Forest, where many spots are now bogs which formerly were ploughed lands. Self-preservation, nature's superior law, may be pleaded in extenuation of the conduct of the Romans, but the act of the Norman is unpardonable.

Suppose these events had not been recorded, and at any future time these several bogs should be drained, and the evident marks of their former state be traced, will it be any proof that bogs were formed by the deluge? I should rather think these instances will prove they take their rise from other causes, which I shall endeavour to elucidate.

Peat or moss is a substance that is
light,

light, tough, and spongy, composed of thin flaggy leaves, which are disposed laterally, with innumerable small fibrous roots, and some strong tubular roots or stalks that run down perpendicularly. It is in colour from a black to a light brown, and may be divided into two sorts; the first sort is found in the fen or marshy countries of Northamptonshire, Huntingdonshire, Lincolnshire, Bedfordshire, Cambridgeshire, and the isle of Ely; which is generally of a blackish colour, from the quantity of bituminous matter dispersed in the interstices of the peat, which, tho' soft when fresh dug, becomes of so hard a consistence when dry, that it is not easily broken; but when broke it has a smooth and glossy appearance like pitch.

The second sort is from a very dark to a light brown, is found in most
counties

counties on the side of hills, and under steep hanging banks where the springs from the higher grounds break out, also near rivers and streams. It is not so hard to break when dry as the fen peat, nor so fusible, nor has it any bituminous parts in it that are visible. It is generally admitted to be a vegetable substance: some suppose it in a living, others in a dead state, but be it in which it may it is certainly in an uncorrupted one.

The following reasons leave not a doubt with me of its being a vegetable matter, and in a living state.

First. There are instances of peat holes having been dug out four several times in the memory of man, and of the peat having been taken out four feet at each digging. It is the remark of old persons who work on these bogs that

that such holes (provided they are not too full of water) grow up again in ten or twelve years, if the stratum of peat is not cut through ; but they observe the peat is more light and spongy, does not retain its heat so long, nor afford so many ashes as that peat which has never been dug. It may be urged, from the very wet state of the bog, that it will swell and dilate itself, and so fill up these holes ; this may be the case in light, spongy earth, where the water is pent in, which is generally termed a quagmire, but in true peat the sides of the holes will be found at any length of time to be in as perpendicular a state as when the spade left it, which is an additional proof of its being a vegetable, as all earths settle from a perpendicular to form an angle, from forty-five to sixty degrees of inclination.

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Secondly,

Secondly. On dissecting a piece of peat, its foliage will be found distinct and lateral: as a proof, take a piece from within a foot of the surface, and on a moderate compression you will find it will lose eight tenths of its thickness; but use the same force in lateral pressure, it being against the grain, it will not lose one fourth. Besides roots and flaggy leaves, there is also every now and then a thick hollow tube in which the lateral leaves are inserted, composed of very strong rigid fibres that run down perpendicularly; these are so strong as to make the tube impervious to the water, and are for the conveyance of air to such part of the bog as is within about four feet of the surface; after that depth I am inclined to think vegetation ceases, from the peat that is dug there being more compact and weighty, and containing no roots or air tubes: as there
is

is ever a fermentation in the change of all bodies from an entire to a corrupted state, so it is probable, in this case particularly, from the peat being darker, that there is a gentle one sufficient to dissolve the tubes and roots, but that the want of heat and the admission of the external air, together with the accessent qualities of peat, retard a further putrefaction.

Thirdly. On analysing a piece of peat, it will, like other vegetables, be found to contain salts and oil in its composition, and consequently must be classed with them, and not as a soil; for there are no salts in any species of earth, at least in these kingdoms, tho' historians and travellers confidently assert that the soils in the more southern latitudes abound with it.

That the bowels of the earth contain

tain great quantities of bituminous matter is evident from the large masses of bitumen thrown up by the different burning mountains in every part of the world, in which its former state of fluidity is very visible; and if Sir William Hamilton, in his observations on volcanos, is right in his idea that pumice is calcined bitumen, the quantity must be immense; as the soil of Etna and Vesuvius, and their neighbourhood, is composed of little else. It is common in Lombardy, the Electorate of Hanover, Neuchatel, and in Auvergne, in France; at which latter place it exudes on the surface of the earth in such quantities, as to be troublesome: England also affords a great deal. Bitumen, except the solid sorts, as pitcoal, &c. gains its consistence from the air; but in the earth it is generally fluid, and the waters in their passage receive its mineral oil,
which

which contains a manifest acid, and which either floats distinct on their surface, or is more intimately dissolved or mixt in smaller quantities.

My opinion is, that peat bogs originate from these waters, and that the vegetable part of peat is a species of marsh moss, whose character I have nearly described before, which grows spontaneously in waters thus impregnated; for all vegetables have no doubt a regular structure, having vessels for receiving and perspiring different fluids; and the nutriment they imbibe is changed into new juices peculiar to themselves, by being secreted and elaborated in the body of the plant by a power of which we know only the effect; thus each kind of soil or water abounds in plants natural to it, and which degenerate or cannot exist in others.

Dr.

Dr. Dillineus has amply treated on the mosses, and has traced out near 600 different sorts, a great number of which are of the marsh kind; many of these vegetate in the several waters according to their degrees of astringency, or bituminous or chalybeate quality; it would be therefore uncertain to mark the botanic character of a moss that composes the peat of any particular bog from among so great a variety; nor is it material, in the general view of improvement, to shew any thing more than that peat is a vegetable substance.

Mr. King, in the paper just before quoted, speaking on the formation of bogs, says, " As it grows higher and
 " drier, and the grass, roots, and
 " other vegetables, become more putrid, together with the mud and
 " slime of the water, it acquires a
 " blackness

“ blackness, and grows into what we
 “ call a peat bog.” In this I must
 differ from Mr. King; for certainly
 if peat was a mass of putrid matter it
 could not be endued with the property
 it has of preserving putrescible sub-
 stances, and it will presently appear
 that the ashes of peat contain a fixed
 alkaline salt; this proves that peat
 cannot consist of a putrid matter, par-
 ticularly rotten vegetables, from which
 the ablest chemists agree no fixed salt
 is producible, unless the new method
 of preparing potash given by Dr. Per-
 cival, in the 22d article of the philo-
 sophical transactions for the year 1780,
 be an exception to this general rule.

Nor is the blackness of a bog ac-
 quired, as Mr. King mentions: the rea-
 son of it, and of the water that flows
 over peat ground being of a muddy
 purple colour, is from the moss being
 an

an astringent vegetable, which, like the oak and other plants that yield their astringency to water, gives it that purple tinge; and this is a further proof of the vegetable part of peat being a species of moss, as all the different sorts, whether foliaceous, fungi, or crustaceous, yield a dye from a reddish brown to a fine purple; but when the flux of water is of a deep black hue, like ink, which often happens, it shews the water of the bog to be of a mineral nature, as it is the characteristic of those plants whose astringency is soluble in water to strike a black with chalybeate vitriol. To shew that waters flowing from peat grounds have sometimes this quality, Mr. Young, in his Eastern Tour, remarks, that those who have water meadows find the water flowing from heath and boggy soils of very little use: and Mr. Boswell, in his very useful

ful treatise on watering meadows, says,
 “ By springs are not here meant those
 “ which rise out of poor heath and
 “ boggy lands, for the water issuing
 “ from them is generally so small in
 “ quantity, and always so very lean
 “ and hungry in quality, that little
 “ advantage, if any, can be reaped
 “ from it.”

All vegetables are liable to corruption, and generally end in it, tho' peat seems an exception to this rule. I cannot, from any authority, or any enquiries I have been able to make, learn a satisfactory reason for its not easily putrifying itself, and its preventing the putrefaction of other bodies, more especially as it contains a large proportion of oil, the greatest subject of corruption that we know. It is difficult to arrive at any degree of certainty in a speculation so abstruse, with-

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out a greater knowledge of chemistry than I can boast of ; yet I will venture to offer the result of my observations.

A due combination of moisture, heat and air, is necessary to cause a fermentation ; but peat, I think, is so moist that it precludes the necessary heat, and its close texture puts an entire stop to the admission, consequently to the influence, of the air, which accounts for its remaining uncorrupted in its natural state ; but when it is dug for burning, and laid to dry so as to be fit to be stacked, or housed for use, it then receives the influence of the air, and must, at some time, have the due quantity of heat and moisture to cause a fermentation, yet none takes place. Frost has hardly any effect on it, as on being exposed thro' the winter it moulders but very little.

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It remains then to examine why peat is so great an enemy to corruption, which cannot be done in any way so easily as by analyzing it : This having been done by the accurate Dr. Home, I quote from him the following experiments :

“ Half a pound of powdered peat
 “ gave, by distillation, during the two
 “ first hours, two ounces of an acid em-
 “ pyreumatic liquor, which was of a
 “ yellow colour, and shewed its acid na-
 “ ture by efferveffing with oil of tartar,
 “ p. d. The strongest fire, continued for
 “ nine hours longer, gave me two drams
 “ of a reddish empyreumatic liquor
 “ more acid than the former, and one
 “ scruple of a thick dark coloured oil.
 “ There was besides, about the neck
 “ of the retort, a great quantity of red
 “ oil, which was too heavy to come
 “ over. The residuum was black.

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“ Some

“ Some peat in the open fire gave
“ about the thirty second part of an
“ alkaline salt.”

This analysis shews that peat contains acids, salts and oil. Every body knows that acids prevent putrefaction, as do all saline bodies. The oil then is the only part that favours corruption ; but it is to be considered, that above one fourth of the component parts of peat are acids, which being endued with a great attractive force unite with the oil, and this concrement cannot revert to its original state; for as the vitriolic acid has the greatest share in the impregnation of all the bitumens, this acid is consequently blended with the bituminous or inflammable matter of the peat, and thereby its acidity and saline characters are destroyed; and it must remain in this fixed state till the inflammable

flammable matter is dissipated, which the bare exposure to the atmosphere is not found sufficient to effect under a very considerable length of time. Hence it appears that the oil cannot tend to putrefaction, consequently no part of peat does. This is no doubt the cause of its incorruptibility; and it is natural to suppose a body, wholly composed of such antiseptics, and which at a certain depth prevents foreign bodies from receiving the immediate contact of the external air, will also preserve them from corruption; and as the moss is an astringent vegetable, this will not appear so extraordinary; especially when the antiseptic power of astringent, bitter and acrid plants are considered; - for Sir John Pringle, in his appendix to his observations on the diseases of the army, observes, among many others, that the soluble part of camomile flowers is not less than

than one hundred and twenty times as strongly antiseptic as common salt: and the use of oak bark in tanning (which depends wholly on its astringent quality) is another example of the very powerful effects of these kinds of vegetables in resisting putrefaction.

There will be some difference in analyzing the fen and the common peat, as the fens in general may be said to be the sink of those rich countries beforementioned. The water from them must of course bring down the bituminous acid juices of those soils, which, from the low situation of the fens, must stagnate there, when in other countries they are carried into the rivers, and by them to the sea.

That acids in fen peat are also stronger than in the common sort appears from its greater fusibility, for
acids

acids are properly the only bodies in nature that can be converted into that species of fire called flame; and from the conjunction of acids and oil, which are so predominant in fen peat, is produced that black, clayey, pitchy, substance called bitumen; these, when properly combined, also afford the chymist true sulphur; by this we see how nearly sulphur is allied to the common bitumens, and the process nature uses to produce them; and this combination, which forms the bituminous part of peat, is a further cause for its being a preservative, as bitumen was formerly used by the Egyptians in embalming the bodies of the dead, the word mummy, which is said to be of oriental origin, signifying bitumen.

It is remarkable, tho' peat is so averse to corruption, yet when once a fermentation

mentation is begun, by the dissipation of its inflammable principle, or by the application of any of the fossil septics, either in their mild or caustic state, the effervescence is so great, from the quantity of acid peat contains, as frequently to eject plants entirely out of the ground; and at that time it is that the various creeping plants (particularly chickweed) establish themselves, which they are ever observed to do in all ground which is in a fermenting state; and to this fermentation it is owing that when the upper layer of peat is cut, and laid to dry, the mould on the top will crumble off entirely from the peat; it consisting only of its decayed parts that have been long exposed to the vicissitudes of the weather, and now finishing the fermentation that was retarded by its wet state, it is so great that not an atom will remain on the fresh raw peat.

Peat

Peat bogs are in many places of a great value for the fuel they afford, which is esteemed wholesome, and adapted to all the culinary uses of the middle station of life; and when charred in order to dissipate its fuliginous and sulphureous parts, it is used in the nicer chemical operations. Another very profitable use to which it may be applied, is lime-burning, as it gives a very strong, tho' not a brisk heat, which makes the operation slower; but that is not material in a perpetual kiln, or indeed in a common one that is under cover and confined at the top to keep in the heat, and that has got a quick draft. The lime will be fit for the husbandman, tho' not quite so saleable for building, as it will contain much bas of red dust from the foulness of the fuel. From peat never having been applied to this purpose in the southern part of England,

E where,

where, from the scarcity of fuel, and coals, during the war being at forty shillings the chaldron, the farmers are at a great expence manuring with lime, one would imagine it was not applicable to this use, tho' in some parts of Scotland and Ireland they have no other fuel for this end: such is the force of custom.

But exclusive of these advantages, the ashes only as a manure have produced from fifty to a hundred pounds per acre, particularly about Newbery in Berks, which county, with Wiltshire and Hampshire, seem the only parts where the true value of this excellent dressing is well understood; and tho' every county affords peat, hardly any burn it for this purpose but those mentioned, who have practised it for ages with such uniform success, that one is at a loss to conjecture why these
ashes

ashes are not more generally used; perhaps the different effects the same quantity of ashes from different places produce, may be one reason; for those from Newbery are so strong that only seven bushels are sown per acre; thirty bushels from many other places are applied with no great success, whereas any crop, manured with such a quantity of Newbery ashes, would be infallibly burnt up. This puts me in mind of a story common at that town, of a farmer that would sow more than usual, and it being a windy day, his neighbours ridge was benefited and his own crop burnt.

Chemistry shews that the ashes of peat consist of an indissoluble earth and a fixed alkaline salt, which is no other than the relicts of acid salt that the fire has not been able to separate from the earth of the mixed body.

These salts are corrosive, hot and fiery, they attract, make an effervescence, and turn neutral with acids, and being reduced to a fluid by the moisture of the atmosphere, mix with the earth, and unite its oily and watery parts.

Some peat ashes also contain a small quantity of a neutral salt.

Hence it appears, that the quantity of ashes per acre must be regulated in proportion to the corrosive acid salt they contain after calcination; those of Newbery affording a great deal, practice has reduced the quantity to be used so low as seven bushels per acre, and those of other places from fifteen to thirty.

Another cause seems to be from the dissimilar effect the same ashes have on the same soil in different seasons;
for

for in one year they shall cause a prodigious increase of fertility, and spend themselves almost entirely, and at another time the effect may be seen plainly for two or three years; but farmers, eager for such sudden fruitfulness, overlook the more gradual benefit, which turns out in the end as much to their advantage, and find fault with a manure for not always performing wonders; this difference can arise only from the peat being improperly burnt, or from the effect of the atmosphere on the ashes: perhaps it may proceed from both these sources. It has been just before observed, that peat ashes consist of an indissolvable earth and a fixed alkaline salt, whose characteristic is always to be similar when pure, however different the subject they are prepared from, but this purity depends on their being more or less calcined. The common method
of

of making peat ashes, is by incinerating the plant with a close smothering heat, which imperfect calcination cannot be thought to afford them ultimately pure, nor yield the most fixed alkali that can be obtained otherwise; as peat abounds so much with acid and oil, two ingredients so absolutely necessary for the formation of alkali, it must yield considerably more in weight than a thirty second part of the whole; the defect then appears not to be in the peat: but in the slow fire made use of to reduce it to ashes, which allows the acid to dissipate, and of course lessens the produce of alkali. I should recommend, that peat, when intended for manure, be burnt in a kiln with a quick draft, it will then be consumed before the dispersion of the acid can take place, and more alkali will be generated.

The

The effects of the atmosphere on the ashes are very remarkable: alkaline salts attract acids more greedily than any other, and retain them when they come within the sphere of their attraction; a variety of experiments prove, beyond all doubt, that the vitriolic acid, and the nitrous acid, exist in the air distinct and separate from each other; which ever therefore happens to be the most predominant at that time, coalesces with the alkali in the ashes, and with it forms different neutral salts: with the nitrous acid, it yields an imperfect nitrous salt, which being easily soluble in water, the effect is very sudden, but the prolific quality is soon over: in combination with the vitriolic acid, it produces a neutral salt that is a true vitriolated tartar, which being the most difficult salt to dissolve, the effect is not so hasty, but it gives a fertility to the soil
very

very observable for two or three years. Dr. Home, in the experiments he made with a view to enquire into the nature of the vegetable food, found vitriolated tartar fertilizing: the corrolary he drew is, " Vitriolated tartar, which " is a composition of the acid of vitriol and an alkaline salt, seems to " promote vegetation very strongly."

When any peat ashes are first tried, about twenty bushels will be found in general to be a very proper quantity; for neither from their weight, the colour of the ashes, or any mode adapted to a farmers comprehension, can their properties be ascertained without practice.

Another caution very necessary is, to sow them as soon in the spring as possible; not by any means later than the middle of February; for as they
are

are hot and fiery, if they are spread after that time, and dry weather should follow, they will burn instead of fertilize.

As a strong proof of the justness of the preceeding reasoning, Sir William Hamilton, speaking of the bituminous ashes from volcanos, says, " They destroy the leaves and fruit, " and are greatly detrimental to vegetation for a year or two, but are " certainly of great service to the " land in general, and are among " the causes of that great fertility " that is in the neighbourhood of " volcanos."

From this it may be concluded, that peat ashes are rather uncertain in their effects; but when they do the least good they must amply repay the charge, there being no manure which

a farmer can make use of at so trifling an expence, as they are only sixpence a bushel in the place, and they may be conveyed by land carriage twenty miles for sixpence more, and when they hit, no dressing is half so cheap; they are generally used on St. Foin clover and other grasses, but they answer particularly well on peas, tares, and other succulent plants, especially on the poor thin chalky soil of Hampshire.

Dr. Home, in his principles of agriculture and vegetation, part 1st, section 5th, recommends peat or moss as proper for the manure of a light sandy soil, which reasoning was confirmed by a gentleman's applying some to such a soil, the benefit of which was very visible, not only in the oats, but in the clover the year following; this theory I have very attentively considered,

dered, more especially as I cannot agree with an author of so great reputation as Dr. Home; for from every observation I have been able to make on the edge of Amberly wild brooks, (a bog of three hundred acres near Petworth, Suffex) which is a rising ground of light sand, where great quantities of peat are wheeled out ready to be conveyed away in waggons, and where small particles of it are scattered of a moderate thickness, I cannot perceive that it is of the least benefit to the grass; and those who live in the neighbourhood, when they clean their sheds, take care to throw away their peat dust, from the experience of its doing harm in their gardens, particularly from the arsmart establishing itself where it is thrown, as it is ever prone to do on all raw crude earth, where nothing else will flourish.

The Doctor thinks the imperfections of a sandy soil are, that it lets the water pass thro' it too easily, and that it contains too few nutritious particles; and he builds his theory on peat being as impervious to the water as clay, whereby it will moisten the sand, and also add nourishment to it by the oil it contains; but he seems to have forgotten its retentive quality, which will not let a particle of the water escape again to moisten the sand; nor can peat make sand more cohesive, there being no substance so light and dry in the summer, and tho' it contains oil, yet not such as can be the food of plants, it being a very thick, heavy, and astringent oil, evidently too gross for entering the pores of roots which are so minute as not to be perceptible to the naked eye; besides it is intimately combined with the acid of peat, from which conjunction

tion I have before shewn a bituminous, pitchy, and sulphureous concrete is produced, which resists dissolution in proportion as it is combined with the vitriolic acid; for the hardness of the different peats, and the consistence of the several bitumens, wholly depend on their commixture with this acid; and the Doctor, in his thirty first experiment of the effects of different substances in regard to vegetation, shews that natural sulphur destroys plants like a poison, tho' he queries whether sulphur arising from vegetables will have the same bad effects; but there can be no doubt of this, for sulphur, under whatever form it appears, is still the same in all its characters.

I am therefore confident peat will be pernicious to any soil, till it has undergone the acetous, and fallen
into

into the putrid fermentation; and even then can be only proper for stiff land, for the salts it contains will hinder its getting thoroughly rotten, consequently it must be a hollow and puffy dressing, very improper for a sandy soil. I may compare it with fern, which plant contains a very great quantity of salts that equally prevent its decaying. All farmers know of what little value its hollow dung is, two load made of straw being worth five of it; I cannot therefore recommend peat in its natural state as a manure, and have ventured to give my reasons for dissenting from such respectable authority.

The neighbourhood of peat bogs is in general reckoned unwholesome, but I believe it is without any foundation; for the cottagers on the edge of Amberly bog are as healthy, and free from

from any complaints attending low and damp situations, as other labourers; nor is the ague so very prevalent in Ireland, considering the immense tracts of these wastes in that kingdom. The edge of a peat bog is undoubtedly a moist situation, but that alone does not make a place unwholesome; for the exhalations are totally different from part of the fens, and the rich marshes near the sea side, which being of a putrid nature are undoubtedly unsalubrious. The great chill that is felt at all times, but especially after very hot days, and the frequent thick fogs, seem to have occasioned this opinion, whereas this cold is occasioned merely by the quick evaporation of the water through this porous spongy soil; for nothing generates cold like evaporation, as will appear from the experiments of Professor Braun, who has formed a table of the different degrees

grees of cold that various fluids produce during this process: and as the air incumbent on peat bogs is very dense, it of course holds more water in solution than a more rarified air; which water being dissolved by the solar heat, is in the cool of the evening precipitated, and thereby the transparency of the air is destroyed, and mists are formed.

Before the draining and improving peat bogs can be properly treated of, it will be necessary to examine the nature and properties of peat itself, which is in the nature of a sponge; for if a dry piece is put in water it will absorb double its weight. Its attraction is so great, that only one fourth of the peat being immersed the water will ascend and make the top damp in a few hours. Its retention is such, that on being taken out, it will discharge no water without

without pressure. This attraction and retention is fully proved in every bog, where small narrow ridges are left in their natural state, from the peat being dug on each side; yet tho' so narrow they remain wet even on the surface, and on being pressed a considerable quantity of water will flow from them.

Many more proofs may be brought, but two will be sufficient: one is, that all peat bogs, except in the fens, are, till drained, from seven to fifteen feet, according to the thickness of the peat they contain, above the water level of the country.

Another is, that on proper drains being dug, at ten rod, or fifty five yards distance from each other, it will alter the surface of the bog from its natural shape to that of a convex one, and the middle or highest ground

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will

will be wettest, which is contrary to every other soil whatever.

When bogs are of any extent there is seldom any bottom to be found under from twenty to forty feet; nor is it very material, provided the peat is from two to three yards thick, which is sufficient, after a gradual draining, to admit cattle to graze, and in summer for carriages to carry off the crop. This is all that can be expected from so bad a foundation. To make it arable will be attended with an uncertainty of success, without a much greater expence; for the number of open drains will obstruct the tillage, and if it is hollow ditched with stones they would be subject to fail, from the reddish consistence, which almost resembles yeast, that spews up and would choak them.

All

All bogs that come under the above description will pay amply for their improvement: the only sort that will not are those which have only a thin crust of vegetable mafs on a sea of water, and lie at the same time so low that the under water cannot be drained off: these must be deemed totally irreclaimable, unless the wetness proceeds from rains stagnating in a low situation where there is no natural vent for the water; in such a situation engines may be made to carry it off; but if there are any springs, or a constant follow of water, the improvement will not answer the expence, which must be very considerable in the first instance, besides a perpetual cost for wear and tear.

As ditches must be the fence, this soil cannot be so effectually drained as it might be, from the necessity there

is of having a quantity of water in them to keep the cattle in their proper bounds; for when they are free from water, the cattle will venture in after the stragling grafs and be smothered: this is likewise the case in marshes, and all soils secured by a ditch fence, which are always dangerous in dry seasons.

The bleak situation of bogs in general makes the raising of any live fence very precarious, if not impossible; and any made fence, from the number of drains necessary, would be expence without end.

The cheapest method of converting a bog is, if there is any river or stream that can be brought above its level, when drained, to make proper dams, heads, and cuts, to water it, which will scour away all its impurities, add
to

to the surface, and make it good meadow; even the most limpid waters will have this effect; and indeed any except such as are chalybeate, which are always more or less enemies to vegetation. The more rapid the water the sooner it will make the surface sound; and if in addition to this a good coat of lime is laid on, it will, by acting as a cement, make it still sounder, and by rendering the oily viscid particles of the bog miscible with water, and proper for vegetation, the improvement will be the quicker.

As it may appear to some rather a paradox that the clearest water will add to the surface of a foil, I may instance those meadows made by Mr. Knot, near Chichester, in Suffex, on a bed of shingly gravel; tho' they have not been done many years, they have acquired a foot of fine mould, and yet

yet are only watered by the chryſtal ſtream of the Lavant.

There is a paſſage alſo in Mr. Boſwell's treatiſe on watering meadows to this point ; he ſays, " Altho' the water is ſo exceeding clear, yet on its
 " being thrown over the land only a
 " few days in warm weather, by drib-
 " ling through the graſs ſo very large
 " and thick a ſcum will ariſe and ad-
 " here to the blades of the graſs as
 " will be equal to a conſiderable quan-
 " tity of manure ſpread over the land,
 " and it may be preſumed from its
 " effects ſtill more enriching."

To inveſtigate this phænomenon it muſt be conſidered that the baſe of all waters is an earth, which is either abſorbent or calcarious, and which is inviſibly ſuſpended in the water by different impregnations. In ſome hard
 waters

waters this fufpenfion proceeds from the nitrous acid, which acid being volatilized by the folar heat, the earth is depofited. In other waters from their being impregnated with fixed air, which becoming elastic in hot weather, the earth is likewise fhaken off.

The atmofpheric air is common to all waters, and this it is that holds diffolved the earthy bafe of fuch as are foft, which are found to part from their air in fo fmall a degree of heat as fixty degrees of Fahrenheits Thermometer, when a precipitation of their bafe of courfe enfues; now as abforbent and calcarious earths are ufed in the manufacture of nitre to attract the nitrous acid from the air, they confequently will act the fame part, when they fubfide, from the water; hence the caufe of the great fertility of fummer

mer floods; as mentioned by Mr. Boswell; and the addition that soils acquire by watering is accounted for from this subsidency.

Where no water can be obtained to flood the bog, another method is, after one or more main sewers of ten feet wide have been opened, to cut smaller sewers of six feet, at ten rod distance from each other: the depth must depend on the wetness of the bog: these are to have proper communication with the main sewers. The following spring the bog will be sufficiently subsided, and dry enough to denshire it and bear cattle. The ashes, both from the denshiring, and from the burning of what comes out of the ditches, must be spread, which, with a liming at the same time, will bring a good and sweet herbage; and this seems the greatest extent of improvement that the

the interior part of the bog will admit of.

But to any distance within half a mile from the edge of the bog, if earth, sand, clay, gravel, or even stones, are carried on, and three loads and a half laid on a square perch, each load containing one square yard, it will cover the surface over just four inches thick. The improvement will be astonishing from the pressure of five hundred and sixty tons on an acre. Trifling as this weight may seem on so much space, yet it will have great effect; for as a bog may be compared to a cheese when first put into a press, so if it is served in this manner, it will be in quite as different a state as a cheese when taken out. There is no doubt but weight alone will cure a peat bog, and that frequent open trenches are the most pro-

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per,

per, on the first draining, to receive the water from its lateral pores; and that three tons and a half weight on a square rod acts just as a press does on a cheese, and effectually cures this soil, so remarkable for its retentive quality. It will render it so firm as to admit of tillage, and also under draining. A course of crops may be taken which will be sufficient to repay all expences, great as they may appear to be; but should this not be the case, from the failure of crops or any other cause, yet the increased, I may say the new created value of the soil at the price that land bears, will leave such a profit as no expenditure of the same sum can ever produce in any other application; which the following calculation of improving one acre of peat bog will shew.

l. s. d. l. s. d.

To the drains that lead
to the main sewer, being
six feet wide, at ten rod
distance from each other,
there will be to each acre
sixteen rod of draining, at
one shilling and sixpence
per rod. - -

1 4 0

To each acres quota to-
wards the main sewer.

0 2 0

To lime at forty shil-
lings per acre. =

2 0 0

To five hundred and
sixty cart loads each, one
square yard will cover the
surface of an acre exactly
four inches thick, the me-
dium distance it will be
carried will be one fourth

Carried over
H 2

£. 3 6 0
of

(52)

	<i>l.</i>	<i>s.</i>	<i>d.</i>	<i>l.</i>	<i>s.</i>	<i>d.</i>
Brought over				3	6	0

of a mile, four carts will
carry fifty loads per day.

The expences will be as
follows:

To five men to fill, at one shilling and two pence each	0	5	10
---	---	---	----

One man to drive, at do.	0	1	2
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Two boys to drive the middle carts, at sixpence each	0	1	0
--	---	---	---

One man to spread, at one shilling and two pence	0	1	2
---	---	---	---

Wear and tear of carts and harness per day	0	1	6
---	---	---	---

Carried over	£.	0	10	8	3	6	0
					Carrying		

(53)

	<i>l.</i>	<i>s.</i>	<i>d.</i>	<i>l.</i>	<i>s.</i>	<i>d.</i>
Brought over	0	10	8	3	6	0

Carrying fifty load per
day, an acre will take
eleven days.

11

5 17 4

The ten odd load will
be about

0	2	2	
			5 19 6

I suppose this work
done in summer, when
either horses or oxen will
be kept at grass, I shall
charge three shillings per
week for each, which is
more than it can cost the
improver for their grass.
As ten horses will be ne-
cessary for the ten carts,

Carried over

£. 9 5 6
their

	<i>l.</i>	<i>s.</i>	<i>d.</i>	<i>l.</i>	<i>s.</i>	<i>d.</i>
Brought over				9	5	6
their keep for the eleven days will be				2	15	0

No doubt every improver would wish to lay down this sort of land to grafs, being most natural to it, as soon as possible; I think the following course of crops very suitable.

To begin with rye. Two ploughings at six shillings per acre.	-	0	12	0
--	---	---	----	---

Harrowing and water- furrowing.	-	0	3	0
------------------------------------	---	---	---	---

Two bushels and a half of rye for seed, at three shillings per bushel.		0	7	6
--	--	---	---	---

Carried over	£.	1	2	6	12	0	6
--------------	----	---	---	---	----	---	---

Reaping

(55)

	<i>l.</i>	<i>s.</i>	<i>d.</i>	<i>l.</i>	<i>s.</i>	<i>d.</i>
Brought over	1	2	6	12	0	6
Reaping, at five shillings per acre.	0	5	0			
Carting to stack.	0	1	6			
Thrashing two quarters and a half of rye.	0	5	0			
				1	14	0

Peas to be the next crop: The rye stubble to be ploughed once and harrowed, then raftered or half ploughed very fine; the peas to be sown broadcast, and the ground harrowed across the rafters to make them come up in drills, that they may be hand-hoed in case the ashes

Carried over $\pounds$. 13 14 6
from

l. s. d. l. s. d.

Brought over 13 14 6
 from the denshiring should
 force the natural grafs to
 vegetate too strongly.

Once ploughing. 0 6 0

Raftering or half plough-
 ing. - 0 3 0

Harrowing and water-
 furrowing. - 0 3 0

Four bushels of peas
 for seed, at four shillings
 per bushel. - 0 16 0

Hooking, per acre. 0 3 0

Carting home. 0 1 6

Carried over £. 1 12 6 13 14 6

Thraffing

(57)

	<i>l.</i>	<i>s.</i>	<i>d.</i>	<i>l.</i>	<i>s.</i>	<i>d.</i>
Brought over	1	12	6	13	14	6
Thraſhing two quarters and a half of peas.	0	4	3			
				1	16	9

The pea ſtubble to be
twice ploughed for oats :

To two ploughings, at fix ſhillings each,	0	12	0
--	---	----	---

To four buſhels of oats for feed, at two ſhillings per buſhel.	0	8	0
--	---	---	---

To harrowing and wa- terfurrowing	0	3	0
--------------------------------------	---	---	---

Mowing, cocking, and carrying	0	3	6
----------------------------------	---	---	---

Carried over	<i>£.</i>	1	6	6	15	11	3
	I				Thraſhing		

(58)

	<i>l.</i>	<i>s.</i>	<i>d.</i>	<i>l.</i>	<i>s.</i>	<i>d.</i>
Brought over	1	6	6	15	11	3
Thrashing six quarters of oats, at one shilling.	0	6	0			
				1	12	6

Grass seeds of all kinds
to be sown with the oats,
as rye grass, clover, cow
grass, trefoil, Dutch clo-
ver, plantain and other
grasses, per acre -

10 0

Total expence of laying
down an acre of peat bog,
and draining, improving,
and cropping the same

17 13 9

The profits of this improvement
must now be taken into consideration,
which will be nearly as follows:

To

(59)

l. s. d. l. s. d.

To two quarters and a
half of rye, at three shil-
lings per bushel

3 0 0

To two quarters and a
half of peas, at four shil-
lings per bushel

4 0 0

To six quarters of oats,
at sixteen shillings per
quarter

4 16 0

To mowing or pastur-
ing the grafs seeds

1 4 0

13 0 0

Which being deducted
from the total sum of
expences, makes the im-
provement of an acre of
peat bog come to

1 2

4 13 9

Now

Now if the bog in this improved state only lets at ten shillings per acre, it will be realizing an estate at about nine years purchase; and if sold at twenty seven years purchase, the profit will be eight pounds sixteen shillings per acre. Great as this profit appears to be, the calculation has been made with strict impartiality on both sides, and will, I think, be found to be nearly the average expence of the improvement in any country: but if it should be thought erroneous, there is room sufficient to make large deductions, and even then the expenditure will be uncommonly profitable, and should rouse the lethargic owners of large tracts of this waste soil to set about the improvement, so beneficial both to themselves and the public.

Many will suppose no corn can grow, others that the crop is estimated at

at too much, both in quantity and price; for my part I have only one doubt, which is, that the great fermentation of so much moved earth, the rotting of the soil under, and the ashes from the denshiring, will cause the rye to be too gross, the haulm of the peas to rot, and so much straw to the oats as to make a thin sample of corn; was it not for this, the rye might be set down at four quarters, the peas at five, and the oats at eight quarters; nor do I think it unlikely for such crops to be produced: but in some measure to remedy this evil the lime is ordered, for besides the other good effects of this dressing, it will be found to make all corn crops it is put to kern well.

To satisfy those who think no corn will grow it may be observed, that Mr. Mortimer, in his husbandry, gives
an

an account of black, boggy, turf land, in Cheshire, being improved to twelve times its original value by sanding it with six hundred loads per Cheshire acre, (which is something more than two statute acres), when it produced oats and tares without ploughing, and after being dunged yielded such crops of grass as to be mowed twice in a year.

Dr. Home, in his agriculture, speaking of the faculty plants have to accommodate themselves to their situation, says, " At the seat of Mr. Burnet, at Kenmay, ten miles from Aberdeen, a kitchen garden, a flower garden, a wilderness of trees, indigenous and exotic, are all in a peat moss, where water stagnates from one to two feet under the surface."

And the Marquis of Turbilly, in
his

his Memoire sur les Defrichemens, relates, that in his improvement of bogs he found that beans, peas, carrots, turnips, cabbages, and potatoes thrive exceedingly, (the cabbages in particular) which produced him eighteen pounds eleven shillings and ten pence halfpenny per acre; and this bog was so wet it sunk a foot in draining: he afterwards tried hemp, which succeeded.

Reference may be made also to the improvement of Hatfel Moss, near Liverpool, mentioned by Mr. Young, which is conducted by Mr. Parke of that town. After many small drains being cut and denfired, it was ploughed by a horse shoed with boards, and sowed with rye, which there was no possibility of harrowing, it being so wet; yet it produced three quarters per acre, then four quarters of oats
per

per acre, and came to a good pasture naturally. The defect appears, by Mr. Young's account, to be from the peat not being thick enough when subsided to form a good crust; but if in this state it bore such crops, those who are disposed to cavil cannot, under the circumstances of so much better management, think the crops in the foregoing estimate overrated.

This Essay, like many others, may possibly be treated as visionary; but as it is founded on experiments, and attentive observations, I think I cannot do better than by relating them.

Having about six acres of peat ground, through the middle of which there is a stream, particularly in winter, I ordered it to be cleaned, and what came out to be cast on one side only, that I might turn and keep the
water

water over one half of the bog. I had no other object then but to keep the old ditch dry that the peat might be more conveniently dug on the lower side of the bog. The water was thus continued for near two years, when part of the mound gave way, and not having occasion to dig any more peat the water resumed its natural course. The side where the water run is now a very tolerable meadow; the moss, rushes, and other aquaticks are nearly gone, and it affords such forward pasture that I reckon one years grass to be worth more than it yielded for seven years before watering.

As a proof of the good effect of watering these foils, Mr. Boswell, in his tract before quoted, says, “ Lands
 “ that are very boggy require more
 “ and longer watering than any sand or
 “ gravelly foils: the larger the body of

K

“ water

“ water that can be brought upon them
 “ the better; its weight and strength
 “ will greatly assist in compressing the
 “ foil, and destroying the roots of the
 “ weeds that grow upon it; neither
 “ can the water be kept too long upon
 “ it, particularly in the winter season,
 “ immediately after the after-
 “ meat is eaten (the closer it is fed
 “ the better.) This species of foil,
 “ well watered and drained, will
 “ equal the wishes of the most sanguine
 “ by its improvement.”

In another place he observes, it has
 often been a subject of dispute whether
 throwing a strong body of water from
 autumn to candlemas is beneficial to
 meadows or not. The general opinion
 of the watermen on this point is :

“ A boggy, cork or spongy foil will
 “ admit of a very large and strong
 “ body

“ body of water upon it with great
 “ advantage for almost any length of
 “ time at that season: the weight and
 “ force of the water vastly assist in
 “ compressing these foils, which only
 “ want solidity and tenacity to make
 “ them produce great burthens of hay;
 “ nothing, in their opinion, corrects and
 “ improves these foils so much as a
 “ strong body of water kept a considerable
 “ time upon them at that season.”

This being an observation from practice deserves particular attention.

These proofs of the good effects of
 watering bogs, besides a number of
 others that might be brought, will, I
 hope, justify my recommending it as
 a certain and cheap cure for these
 wastes.

The next mode pointed out, that of
 six feet ditches every ten rod, is what I

K 2

have

have never practised myself, but it has been done with great success in Amberly Wild brook, (the bog mentioned before) on which two parishes have a right of common. One has carried on the improvement a mile into the bog, and half a mile wide, by means of such ditches, which, with a common denshiring and left to turf themselves, are become good meadows, worth from twelve to fifteen shillings per acre, have an early bite in spring, and are fit for fattening cattle during the first summer months; but after that they do not force them forward. These ditches are unfathomable as well as the unimproved part of the bog, which, I must remark, is ten feet higher than these fields; another proof of the very retentive spongy quality of this soil. Two or three farmers have varied, by not making these six feet ditches so frequent, but have cut a
number

number of smaller ones that fall into them, but these grounds are not worth so much by one fourth as where the six feet ditches are made every ten rod. This mode is certainly eligible and very cheap, which the following calculation will shew.

	<i>l.</i>	<i>s.</i>	<i>d.</i>
To each acre's quota towards the			
main sewer - - -	0	2	0

To sixteen rod of draining to each			
acre, at one shilling and sixpence per			
rod, being at ten rod distance from			
each other - - -	1	4	0

To denshiring, per acre -	1	1	0
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Total expence, per acre	<u>£.</u>	2	7	0
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I am far from thinking that all bogs, when thus drained, will fetch from twelve to fifteen shillings per acre; for some are composed of very rich materials to what others are, which is an instance what different effects the same elements produce only from their being combined in different proportions; yet I cannot but think that the worst will pay ample interest for the money laid out, without taking into consideration the new created value of the land, which, in its unimproved state, may be said to be worth nothing.

If my advice is taken to add a coat of lime, the expence will be forty shillings per acre more. As it is a great solvent for all vegetable bodies, and an attractor of oil and acids, which three things compose peat, as it will help the junction of the alkaline salts
in

in the ashes from the denshiring with the oil in the peat, and so render it miscible with water, and as it will make the surface pervious to the external air, and dissipate its inflammable principle, it must, from the combination of so many good effects, fully answer any expence.

The third method recommended, that of carting earth, &c. on the bog, tho' more expensive will be found to be the cheapest in the end, as this addition to the soil will make it much more valuable than under the last mode of improvement; for from the examples before given of the very retentive quality of peat, it cannot be thought that either open or hollow drains will bring it to a perfectly dry state; in short, nothing but weight and pressure, joined to proper draining, will ever be found to effect that; and carting earth
on,

on, and heavy rolling every time the grafs will admit, appears to be the moft cheap and speedy means of doing it. Good earth will certainly be beft, but it is not fo very material as may be imagined, for the chief benefit will arife from its weight. The pooreft fand, incapable of bearing any thing in its natural ftate, will, when carried on a wet bottom, produce large crops. The following inftance will be a proof of it.

Having a piece of rough ground, containing four acres, about half of it was a peat bog that a hop-pole might be run down twenty feet; the other half, a barren black and white fand. On account of its near fituation to the houfe I ordered the fand part to be carted on the bog, and the whole to be made level: fome part might be covered eighteen inches, fome a foot, and

and in other parts not above six inches, as I wished it to be a level pasture as a view from the house. I had no ditches dug, the sandy part was manured, and it was sown with grass seeds in the middle of June, before which time it was not compleated, and I moved two tons of hay per acre the September following. It is now a very dry good pasture and carries large crops of hay, but the part where the bog was is always gross, and no person that did not know the land before would ever suppose it had been a bog. I do not mention this as an improvement that answered the expence, as it was undertaken from a different motive, it is only to shew that weight alone, even without ditches, will cure a peat bog, but that draining, without pressure, will never completely do it, from its very retentive nature.

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Mr.

Mr. Young, in his Eastern Tour, speaks in high terms of the improvement of a bog by Mr. John Eddison, of Gateford, Nottinghamshire, and as it is very pertinent to the present subject I cannot do better than give the experiment in his own words.

“ Mr. Eddison’s improvement of a
 “ bog is, I believe, original; it is cer-
 “ tainly curious. The field contains
 “ eight acres, was rented at three shil-
 “ lings per acre. Mr. Eddison began
 “ the improvement of it by cutting
 “ some open drains, at the expence of
 “ five pence and ten pence per acre, of
 “ twenty eight yards; the whole came
 “ to seven pounds seven shillings: he
 “ then carted on it one thousand and
 “ three loads of sand and earth, forty
 “ bushels each; they were carried
 “ three hundred yards, the expence
 “ ten shillings and sixpence per forty
 “ loads:

“ loads: after this he carted on it four
 “ hundred loads of twitch grass, at
 “ one shilling each, twenty pounds.
 “ This article of improvement must
 “ sound so very odd, that a little ex-
 “ planation is necessary: the country
 “ is chiefly sand, and the weed most
 “ common on all the sands of this
 “ country is twitch; the quantity of it
 “ is truly astonishing: you hear far-
 “ mers talk of two or three hundred
 “ loads of twitch picked off their land
 “ in a familiar manner, as if it was
 “ not at all extraordinary. This is so
 “ much the case, that I was induced,
 “ after I had been in the country a
 “ short time, almost to think it a ne-
 “ cessary evil; but the whole is cer-
 “ tainly owing to bad husbandry, for
 “ I found the best cultivated fields had
 “ the least of it; and Mr. Eddison
 “ assured me that the closes which he
 “ had gotten into good order were per-

“fectly free from twitch; it is the
“running two or three crops together
“that fills the land with this weed:
“Some very capital slovens assert that
“twitch is a very good friend to the
“farmer, and that they should not be
“able to get any corn if the land was
“not full of it. To attempt to reason
“with such fellows is an absurdity: I
“was inclined to seize a hedge stake,
“in order to break it about the bones
“of one who gave me this intel-
“ligence.

“Mr. Eddison, on coming to his
“farm, found this blessed commodity
“so much the staple of it that he had
“ample materials for improvement.
“The twitch takes root, and forms a
“matted net work of roots on the bog,
“so that it is bound quite into a firm
“surface; and what is extremely re-
“markable, the twitch vegetates in its
“new

“ new situation no longer than just to
 “ produce that effect; for a fine carpet
 “ of fine clover presently rises, and
 “ likewise other valuable grasses, so
 “ that in the following crops of hay
 “ the twitch is scarcely perceptible,
 “ and soon quite disappears. The ef-
 “ fect is so great that the meadow is
 “ now such as would let for a guinea
 “ an acre; I saw the crop of hay, and
 “ found it a very good one. The ad-
 “ joining close is now a bog, and al-
 “ most swallows up the calves turned
 “ on it; the only stock they venture
 “ on. One spot of about half a rood
 “ was covered with about fifty six
 “ bushels of lime; or above four hun-
 “ dred per acre. The effect was,
 “ making the surface sound, but the
 “ grass, the second and third year,
 “ not so good as that from twitch the
 “ first. Lime alone, Mr. Eddison does
 “ not recommend as profitable, for
 “ want

“ want of the twitch binding the sur-
 “ face first: mixt with earth it is much
 “ better. The field is now very well
 “ worth a guinea an acre; Mr. Eddi-
 “ son would not take that rent for
 “ it; the white clover is very thick
 “ and luxuriant in many parts of it.
 “ In dry, burning seasons he finds it
 “ of particular use, for it supports cat-
 “ tle well when he has no other food.
 “ This year he fed it from the four-
 “ teenth of April to the twenty first day
 “ of May; which he values at ten
 “ shillings an acre alone; and it now
 “ yields a ton of hay per acre, after
 “ that late feeding. The expence of
 “ the improvement he calculates in
 “ the following manner:

“ One

	<i>l. s. d.</i>
" One thousand and three loads	
" of sand, at ten shillings and sixpence	
" per forty loads	13 2 6
" Four hundred loads of twitch, at	
" one shilling	20 0 0
" Draining	7 7 0
Total,	40 9 6
Which is, per acre,	£. 5 1 2

" The return, if it amounts to only
 " one pound ten shillings per acre, is
 " a profit of thirty per cent on the
 " capital employed.

" There can be no doubt, from this
 " very useful experiment, but that
 " twitch may be employed to a very
 " profitable purpose; but as I much
 " hope that few will be able thus to
 " improve bogs, let me remark, that
 " there

“ there is reason to conclude it is not
 “ altogether necessary. The draining
 “ is here considerable. I viewed the
 “ cuts, and found them numerous and
 “ deep; these, with eight quarters of
 “ lime on half a rood, worked a great
 “ improvement, tho’ not equal to that
 “ of sand and twitch; but Mr. Eddi-
 “ son observed that lime and earth did
 “ well; that is the increased weight
 “ did well: I am convinced that weight
 “ alone will improve a bog: the drain-
 “ ing begins the work, and then the
 “ pressure of one hundred and twenty
 “ five loads of sand per acre nearly ef-
 “ fected the rest. Fifty loads of twitch
 “ makes the weight yet greater, and
 “ consequently must be of great ser-
 “ vice: and when it rots it certainly
 “ becomes a good manure. The white
 “ clover is by no means brought by
 “ the twitch, but the sand, an effect
 “ found before. The great utility of
 “ pressure

“ preffure on a bog, is feen in that
 “ improved by the Duke of Bridge-
 “ water, at the head of his navigation,
 “ by carrying large quantities of re-
 “ fufe ftone on it.”

This was the ftate of this little Effay when I met with Mr. Young’s Irifh Tour: The different experiments of noblemen and others which he has registered exactly tally with the trials I have made, and the theory I have advanced. The many instances he gives of bogs being in part cultivated producing fine crops of oats, barley and potatoes, the remainder in its original ftate, fhews there is no fear on the fcore of crops; and Mr. Young judges, by thefe experiments, and by the roads made over bogs, that gravel, fand, and earth improve them and bring good grafs: he thinks that the black bogs are good, being folid to their
 M furface,

surface, yielding many ashes, and are improveable tho' expensive. The red soil is much more spongy, yields no ashes, and is irreclaimable. Some bogs are fifty feet deep and many deeper, but there is no occasion to cut to the bottom for draining: When reclaimed they are worth from one to three pounds per acre.

The most remarkable improvements registered are those of Mr. Lloyd, who drained a shaking morass from five shillings to be worth thirty shillings, (some actually let at thirty eight shillings). He was at one thousand pounds expence to bank out a river, which is directly contrary to the experiments of Mr. French, of Moniva, who converted his drained bog into water meadow. Thus many a useful undertaking is exploded by useless expences, and through ignorance of the various ways
of

of improvement. This example of Mr. Lloyd's expending so large a sum to divert instead of obverting the river, to him will, I hope, be thought a sufficient excuse for the appearance of this trifling treatise, least other gentlemen, not knowing the different modes of practice, may be led into a like error.

The sinking of the bog at Moniva, to let in a prospect which it before excluded, is another proof of the very retentive quality of peat; and Mr. French's caution of letting a bog subside for a year or two before gravelling or weighting it, as it sinks too suddenly when put on in a wet state, is very material; but not having been inconvenienced by this in my little practice it did not strike me till I read the Irish Tour.

All the experiments of Frederick French Esq; of Woodlawn, which are numerous and valuable, tend uniformly to shew that weight alone is the only thing to be depended on in the reclaiming these wastes. His information that they never rot sheep, but rather recover those that are touched with that disorder, appears extraordinary. I should rather doubt the same effect taking place here, as there are no lands so prejudicial to sheep in general as the moory peat soil. Possibly their being improved by the limestone gravel and sand may prevent the bad effects which are too generally experienced in this kingdom.

Several minutes of the Tour inform us that trees of all sorts thrive very much in drained bogs. I cannot help thinking but that this is likewise owing to the limestone gravel, as I cannot
recollect

recollect any where here that any sort of trees prosper; even the alder, withy, and other natural produce, grow stunted, and never arrive at any perfection.

The limestone gravel and sand with which Ireland abounds, makes the reclaiming bogs much easier than in England, as the liming and pressure are done under one expence; nor will any other sort of manure bring such sweet herbage as limestone gravel. Thus I have related my experiments faithfully; which, tho' not extensive, are yet pertinent to the subject. I think, from them and the passages of the different authors I have quoted, some useful conclusions may be drawn, particularly that peat bogs will produce large crops of corn and pulse, a fact which half the proprietors of these wastes in this kingdom are totally unacquainted with; and it will give me
pleasure

pleasure if, from my remarks on the origin and nature of bogs, I have thrown so much light on the subject as to lay a foundation for some body more qualified to build upon. The attempt being difficult will, I trust, be a sufficient excuse for this Essay not being more perfect.

Dr. Home very justly observes, that
 “ Mankind are shy in attempting any
 “ thing, or at least to render it public,
 “ unless they can make it complete, or
 “ erect some plausible system. This
 “ they may do in all other arts but
 “ they cannot in agriculture.

“ And he remarks, with equal justice,
 “ that agriculture, seemingly so
 “ easy, appears, from the scarcity of
 “ good authors, to be the most difficult
 “ cult of arts.”

F I N I S.



